

MILITARY SPECIFICATION

CAPACITORS, FIXED, METALLIZED (PAPER, PAPER-PLASTIC, OR PLASTIC FILM)
DIELECTRIC, DIRECT CURRENT
(HERMETICALLY SEALED IN METAL CASES),

GENERAL SPECIFICATION FOR

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

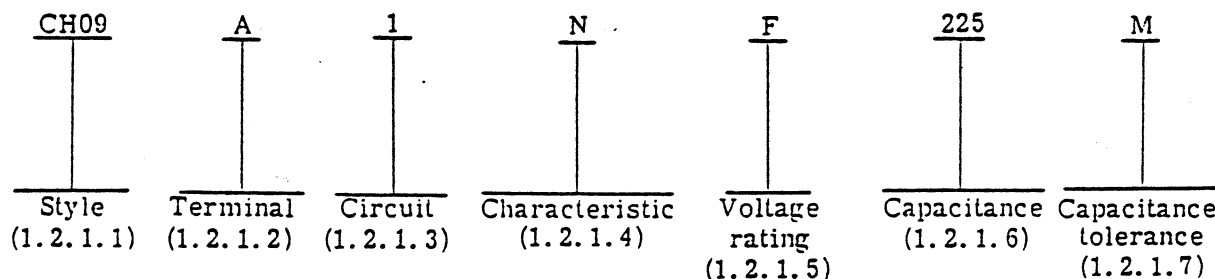
INACTIVE FOR NEW DESIGN AFTER
8 January 1970. USE MIL-C-39022

1. SCOPE

1.1 Scope. This specification covers the general requirements for fixed capacitors with metallized (paper, paper-plastic or plastic film) dielectric, direct current, hermetically sealed in metal cases. These capacitors should only be used in circuitry in which high values of insulation resistance are not essential, and in which occasional momentary breakdowns can be tolerated.

1.2 Classification.

1.2.1 Type designation. The type designation shall be in the following form, and as specified (see 3.1):



1.2.1.1 Style. The style is identified by the two-letter symbol "CH" followed by a two-digit number: the letters identify metallized (paper or plastic film) dielectric, fixed capacitors, and the number identifies the shape of the capacitor.

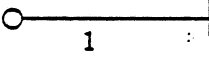
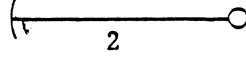
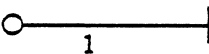
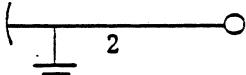
1.2.1.2 Terminal. The terminal is identified by a single letter as shown in table I.

TABLE I. Terminal.

Symbol	Description
A - - - - -	Axial wire-lead
B - - - - -	Solder lug (nonremoveable)

1.2.1.3 Circuit. The circuit diagram (and the number of terminals associated with each diagram) is identified by a single number as shown in table II.

TABLE II. Circuit diagram.

Symbol	Circuit diagram	
1 - - - - -		
3 - - - - -		

1.2.1.4 Characteristic. The characteristic is identified by a single letter as shown in table III.

TABLE III. Characteristic.

Symbol	Operating temperature range ($\pm 3^{\circ}\text{C}$)
R - - - - -	-55 to $+85^{\circ}\text{C}$
N - - - - -	-55 to $+125^{\circ}\text{C}$

1.2.1.5 Voltage rating. The dc voltage rating is identified by a single letter as shown in table IV. For recommended ac ratings, see 6.8.

TABLE IV. DC voltage rating.

Symbol	DC voltage rating (Volts)
A - - - - -	50
V - - - - -	150
C - - - - -	200
E - - - - -	400
F - - - - -	600

1.2.1.6 Capacitance. The nominal capacitance value expressed in picofarads (pF) is identified by a three-digit number; the first two digits represent significant figures and the last digit specifies the number of zeros to follow.

1.2.1.7 Capacitance tolerance. The capacitance tolerance is identified by a single letter as shown in table V.

TABLE V. Capacitance tolerance.

Symbol	Tolerance
	(Percent)
J - - - - -	± 5
K - - - - -	± 10
M - - - - -	± 20

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

QQ-S-571 - Solder; Tin Alloy; Lead-Tin Alloy; and Lead Alloy.

MILITARY

MIL-I-10 - Insulating Materials, Electrical, Ceramic, Class L.
 MIL-M-14 - Molded Plastics and Molded Plastic Parts, Thermosetting.
 MIL-P-116 - Preservation, Methods of.
 MIL-C-39028 - Capacitors, Packaging of, General Specification For.
 MIL-R-39034 - Retainers, Holddown, Metal, Removeable, General Purpose,
 General Specification For.
 MIL-C-45662 - Calibration System Requirements.

(See supplement 1 for list of associated specification sheets.)

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
 MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw-Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D56-64 - Method of Test for Flash Point by Tag Closed Tester.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the latter shall govern (see 6.1).

3.2 Qualification. Capacitors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.2).

3.3 Material. The material for each part shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the capacitors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.3.1 Ceramic. Unless otherwise specified herein, ceramic materials shall conform to grade L311 of MIL-I-10, or any other grade in which the individual designators for dielectric loss factor, dielectric strength, and flexural strength are numerically higher.

3.3.2 Molded plastic. Unless otherwise specified herein, molded plastic material shall conform to type MFE, or better, of MIL-M-14.

3.3.3 Insulating, impregnating, and sealing compounds. Insulating, impregnating, and sealing compounds, including varnish and similar materials, shall be chemically inactive with respect to the capacitor unit and the case (see 3.4.3). The compound, either in the state of original application or as a result of having aged, shall have no adverse effect on the performance of the capacitor. For liquid-filled capacitors (see 6.5.1), the same material shall be used for impregnating as is used for filling.

3.3.4 Metals. Metals shall be of a corrosion-resistant type or shall be plated or treated to resist corrosion.

3.3.4.1 Iron and steel. The use of ferrous material for current-carrying parts will not be permitted, except that annealed copper-clad steel wire (30-percent minimum conductivity) may be substituted as terminal leads (see 3.4).

3.3.4.2 Dissimilar metals. Where dissimilar metals are used in intimate contact with each other, provision shall be made to provide protection against electrolysis and corrosion. The use of dissimilar metal in contact, which may tend toward active electrolytic corrosion (particularly brass, copper, or steel used in contact with aluminum or aluminum alloy), will not be acceptable; however, metal-plating or metal spraying of dissimilar metals onto base metals to provide similar or suitable abutting surfaces will be permitted (for example, the spraying of copper on aluminum for soldering operations will be allowed). The use of dissimilar metals separated by insulating material will also be permitted.

3.3.4.3 Solder. Solder for electrical connections shall be in accordance with QQ-S-571.

3.4 Design and construction. The capacitor shall be of the design, construction, and physical dimensions specified (see 3.1).

3.4.1 Threaded parts. Unless otherwise specified herein, threaded parts shall be in accordance with Handbook H28. Where a special diameter-pitch combination is required, the thread shall be of American National form and of any pitch between 16 and 36 which is used in the fine-thread series.

3.4.1.1 Engagement of threaded parts. All threaded parts shall engage by at least three threads.

3.4.1.2 Locking of screw-thread assemblies. All screw-thread assemblies shall be rendered resistant to loosening under conditions of vibration. Lockwashers shall be provided under all nuts. Where a screw mates with a plastic part, a threaded metal insert shall be molded therein.

3.4.2 Terminals.

3.4.2.1 Solder-lug terminals. Solder-lug terminals may be of any shape, provided dimensional limits are met, and shall be coated with solder having a tin content of 40 to 70 percent.

3.4.2.2 Screw terminals. Screw terminals shall be supplied with one nut, one flat washer, and one lockwasher.

3.4.2.3 Axial wire-lead terminals. Leads may be of tinned solid copper wire, copper alloy, or copper clad steel (see 3.3.4.1). Copper alloy or copper clad leads shall have a minimum of 30 percent of the conductivity of electrolytic copper. The leads shall be coated with solder having a tin content of 40 to 70 percent.

3.4.3 Case. Each capacitor shall be enclosed in a hermetically sealed metal case which will protect the capacitor element from moisture, impregnant leakage, and mechanical damage under the test conditions specified herein. The use of exterior cardboard sleeves for insulating purposes will not be permitted.

3.4.4 Capacitor element. The capacitor element shall consist of metallized paper, paper plastic, or plastic film. The capacitor element may be separated by uncoated dielectric tissues.

3.4.4.1 Construction. All capacitors shall have extended electrode construction to minimize inductance.

3.5 Seal.

3.5.1 Liquid or solid impregnated capacitors. When capacitors are tested as specified in 4.6.2, there shall be no evidence of repetitive bubbling.

3.5.2 Liquid-filled capacitors. When liquid-filled capacitors are tested as specified in 4.6.2, there shall be no evidence of liquid leakage.

3.6 Dielectric withstanding voltage. When tested as specified in 4.6.3, capacitors shall be capable of withstanding the dc potentials specified (see 3.1) without permanent damage, or open- or short-circuiting. Momentary breakdowns (see 6.5.2) will be permitted.

3.7 Capacitance. When tested as specified in 4.6.4, the capacitors shall be within the tolerance of the nominal value specified (see 3.1).

3.8 Dissipation factor. When tested as specified in 4.6.5, the dissipation factor of the capacitors shall not exceed the value specified (see 3.1).

3.9 Insulation resistance (see 6.5.2).

3.9.1 Terminal to terminal. When tested as specified in 4.6.6, the product of the nominal capacitance, expressed in microfarads (μF), and the insulation resistance, expressed in megohms, shall be not less than the values specified (see 3.1), as applicable.

3.9.2 Terminal to case. When tested as specified in 4.6.6, where the case is not a terminal, the insulation resistance between terminal and case shall be not less than the value specified (see 3.1).

3.10 Barometric pressure (reduced). When tested as specified in 4.6.7, capacitors shall withstand a dc potential equal to 125 percent of rated dc voltage without visible damage, external flash-over, or open- or short-circuiting.

3.11 Vibration. When capacitors are tested as specified in 4.6.8, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration, or momentary arcing, or other indication of breakdown, nor shall there be any open- or short-circuiting or evidence of mechanical damage (see 6.5.2).

3.12 Salt spray (corrosion). When capacitors are tested as specified in 4.6.9, there shall be no harmful corrosion, and at least 90 percent of any exposed metallic surfaces of the capacitor shall be protected by the finish. Harmful corrosion shall be construed as being any type of corrosion which in any way interferes with mechanical or electrical performance. There shall be no unwrapping of or mechanical damage to insulating sleeves. In addition, corrosion of the terminal hardware or mounting surface shall not exceed 10 percent of the surface area. Marking shall remain legible.

3.13 Temperature cycling and immersion. When tested as specified in 4.6.10, the capacitors shall meet the following requirements:

- (a) Dielectric withstanding voltage.
 - Insulating sleeves - - - - - Not less than 4,000 volts dc.
 - Terminal to terminal - - - - - 150 percent of rated dc voltage.
 - Terminal to case (where the case is not a terminal) - - - - - As specified (see 3.1).
- (b) Capacitance. Capacitance value shall be within 10 percent of the initial value obtained when measured as specified in 4.6.4.
- (c) Dissipation factor. Dissipation factor value shall be not more than 110 percent of the initial requirement.
- (d) Insulation resistance.
 - Insulating sleeves - - - - - Not less than 100 megohms.
 - Terminal to terminal - - - - - Not less than 1/3 of value specified in 3.9.1.
 - Terminal to case (where the case is not a terminal) - - - - - Not less than 1/2 of value specified in 3.9.2.

After the test, capacitors shall show no indication of extensive corrosion or obliteration of marking. There shall be no unwrapping of or mechanical injury to insulating sleeves (where applicable).

3.14 Solderability (axial wire leads only). When capacitors are tested as specified in 4.6.11, the dipped surface of the capacitor leads shall be at least 95-percent covered with a new, smooth, solder coating. The remaining 5 percent of the lead surface shall show only small pinholes or rough spots; these shall not be concentrated in one area. Bare base metal and areas where the solder dip failed to cover the original coating are indications of poor solderability, and shall be cause for failure. In case of dispute, the percent coverage by pinholes or rough spots shall be determined by actual measurement of these areas, as compared to the total area.

3.15 Shock, specified pulse. When capacitors are tested as specified in 4.6.12, there shall be no intermittent contacts of 0.5 millisecond (ms) or greater duration, or momentary arcing, or other indication of breakdown, nor shall there be any open- or short-circuiting or evidence of mechanical damage (see 6.5.1).

3.16 Moisture resistance. When tested as specified in 4.6.13, capacitors shall meet the following requirements:

- (a) Dielectric withstanding voltage.
 - Insulating sleeves - - - - - Not less than 4,000 volts dc.
 - Terminal to terminal - - - - - 150 percent of rated dc voltage.
 - Terminal to case (where the case is not a terminal) - - - - - As specified (see 3.1).
- (b) Capacitance. Capacitance value shall be within 10 percent of the initial value obtained when measured as specified in 4.6.4.
- (c) Dissipation factor. Dissipation factor value shall be not more than 110 percent of the initial value (see 3.8).

(d) Insulation resistance.

Insulating sleeves - - - - -	Not less than 100 megohms.
Terminal to terminal - - - - -	Not less than 1/3 of value specified in 3.9.1.
Terminal to case (where the case is not a terminal) - - - - -	Not less than 1/2 of value specified in 3.9.2.

After the test, capacitors shall show no indication of extensive corrosion or obliteration of markings. There shall be no unwrapping of or mechanical injury to insulating sleeves (where applicable).

3.17 Terminal strength. When tested as specified in 4.6.14, there shall be no permanent damage to the terminals, terminal bushings, or seal.

3.18 Low temperature and capacitance change with temperature. When tested as specified in 4.6.15, capacitors shall withstand the applications of rated voltage without flashover. The capacitance change at the low ambient temperature shall be not more than the applicable value specified (see 3.1) from the initial value specified herein, when measured in accordance with 4.6.4.

3.19 Life. When tested as specified in 4.6.16, capacitors shall meet the following requirements:

- (a) Visual examination. There shall be no leakage of impregnant or filling compound or evidence of corrosion or damage either during or after the test.
- (b) Dissipation factor.

At the applicable high test temperature, after 24 hours but not more than 48 hours from start of test.	Not greater than the value specified (see 3.1) for the applicable high test temperature.
At the applicable high test temperature, any time during the last 48 hours of test.	Not greater than the value specified (see 3.1) for the applicable high temperature.
At +25° C, after life test.	Not greater than the value specified (see 3.1).
- (c) Capacitance.

At +25° C, after life test.	Capacitance value shall be within the value specified (see 3.1) when measured as specified in 4.6.4.
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- (d) Insulation resistance.

At +25° C, after life test:	
Terminal to terminal - - - - -	Not less than the value specified (see 3.1).
Terminal to case (where the case is not a terminal) - - - - -	Not less than the value specified (see 3.1).

3.20 Flashpoint of impregnant. When tested as specified in 4.6.17, the flashpoint of impregnant shall be not lower than 145° C (293° F) (see 6.5.3).

3.21 Marking. The capacitor shall be permanently and legibly marked using smear-resistant ink with the type designation and the manufacturer's name or symbol. If space permits, the capacitance in microfarads and rated voltage shall also be marked. Labels shall not be used. The marking shall remain legible after all tests specified herein. There shall be no space between the symbols which comprise the type designation. Marking shall be on the metal cases and not on the sleeving material. If necessary, the type designation may appear on two lines. In this event, the type designation shall be divided as shown in the following example:

CH09A1
NF225M

3.22 Workmanship. Capacitors shall be processed in such a manner as to be uniform in quality and shall be free from pits, corrosion, cracks, rough edges, and other defects that will affect life, serviceability, or appearance.

3.22.1 Connections. The electrical connections of capacitors shall not depend on wires, lugs, terminals, or other connectors clamped between a metallic member and an insulating material. Where the maintenance of a tight connection depends on the resistance of an insulating material to compressive or shearing stress, such connection shall be securely soldered or welded.

3.22.2 Soldering. Where soldering is employed, only fluxes with low corrosive properties shall be used, unless it can be shown that corrosive elements have been satisfactorily removed after soldering. All excess flux and solder shall be removed. Solder shall not be used primarily for obtaining mechanical strength. Electrical connections shall be electrically continuous after soldering and, where possible, mechanically secure before soldering.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facilities. The supplier shall establish and maintain a calibration system in accordance with MIL-C-45662.

4.2 Classification of inspection. The inspections specified herein are classified as follows:

- (a) Qualification inspection (see 4.4).
- (b) Retention of qualification (see 4.4.4).
- (c) Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified herein, all inspection shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.2) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample size. The number of capacitors to be subjected to qualification inspection shall be as specified in the appendix to this specification.

4.4.2 Inspection routine. The sample shall be subjected to the inspections specified in table VI, in the order shown. Two sample units shall be subjected to visual and mechanical examination and workmanship (internal and external). The remaining capacitors shall be subjected to the remainder of group I inspection. The sample units shall then be divided as shown in table VI and subjected to the inspection for their particular group.

TABLE VI- Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph	Number of sample units to be inspected	Number of failures <u>1/</u>
Flashpoint of impregnant - - - - -	3.20	4.6.17	1	0
<u>Group I</u>				
Visual and mechanical examination- - -	3.3 to 3.4.4.1	4.6.1	2	0
Workmanship (external)- - - - -	3.23	4.6.1		
Marking <u>2/</u> - - - - -	3.21	4.6.1		
Workmanship (internal)- - - - -	3.22	4.6.1	48	0
Seal - - - - -	3.5	4.6.2		
Dielectric withstanding voltage - - - -	3.6	4.6.3		
Capacitance <u>3/</u> - - - - -	3.7	4.6.4		
Dissipation factor <u>3/</u> - - - - -	3.8	4.6.5		
Insulation resistance <u>3/</u> - - - - -	3.9	4.6.6	24	1
Barometric pressure (reduced) <u>3/</u> - - -	3.10	4.6.7		
<u>Group II</u>				
Vibration - - - - -	3.11	4.6.8	12	1
Salt spray (corrosion)- - - - -	3.12	4.6.9		
Temperature cycling and immersion - -	3.13	4.6.10		
<u>Group III</u>				
Solderability (axial wire leads only) - -	3.14	4.6.11	12	1
Shock, specified pulse - - - - -	3.15	4.6.12		
Moisture resistance- - - - -	3.16	4.6.13		
<u>Group IV</u>				
Terminal strength- - - - -	3.17	4.6.14	24	1
Low temperature and capacitance change with temperature <u>3/</u> - - - - -	3.18	4.6.15		
Life - - - - -	3.19	4.6.16		

^{1/} A sample unit having one or more defects will be considered as one failure.

^{2/} Marking defects are based on visual examination only and shall be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

^{3/} Nondestructive tests.

4.4.2.1 Impregnant or filling compound. The sample of impregnant or filling compound (see 20.3) shall be subjected to the flashpoint of impregnant inspection specified in table VI.

4.4.2.2 Capacitors with alternate terminals, insulating sleeve, case materials, and applied finish. Sample capacitors shall be subjected to the examinations and tests of groups I, II, III, and IV specified in table VI in the order shown. After completion of the group I tests, the specimens shall be divided into groups as shown in table VI and subjected to the tests specified in groups II, III, and IV. No defectives will be allowed in group I and one defective will be allowed for each of groups II, III, and IV; however, only a combined total of one failure is allowed for groups II and III.

4.4.3 Failures. Failures in excess of those allowed in table VI shall be cause for refusal to grant qualification approval.

4.4.4 Retention of qualification. To retain qualification, the supplier shall forward a report at 6 month intervals to the qualifying activity. The qualifying activity shall establish the initial reporting date. The report shall consist of:

a. A summary of the results of the tests performed for inspection of product for delivery, Groups A & B, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and accounted for.

b. A summary of the results of tests performed for qualification verification inspection, Group C, including the number and mode of any subgroup failures. The summary shall include results of all qualification verification inspection tests performed on completed lots during the 6 month period. If the summary of the test results indicates nonconformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified product list.

Failure to submit the report within 30 days after the end of each 6 month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time that the inspection data indicates noncompliance of the product to meet the requirements of this specification.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during 2 consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity to submit (the products, a representative product of each style) to testing in accordance with the qualification inspection requirements.

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and B inspection. Except as specified in 4.5.1.1.2.3, delivery of products which have passed the groups A and B inspection shall not be delayed pending results of the group C inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of all capacitors covered by a single specification sheet in accordance with table VII (and by operating temperature range), produced under essentially the same conditions, and offered for inspection at one time.

TABLE VII- Lot inspection groups for group A, B, and C
quality conformance inspection.

Lot inspection group	Style
1	CH09 CH12
2	CH53 CH54

4.5.1.1.1 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table VIII in the order shown.

4.5.1.1.1.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality level (AQL) shall be as specified in table VIII. Major and minor defects shall be as defined in MIL-STD-105.

4.5.1.1.1.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

TABLE VIII. Group A inspection.

Examination or test	Requirement paragraph	Method paragraph	AQL (percent defective)	
			Major	Minor
<u>Subgroup 1</u>				
Seal - - - - -	3.5	4.6.2	} 1	---
Dielectric withstanding voltage - - - - -	3.6	4.6.3		
Insulation resistance at 25° C - - - - -	3.9	4.6.6		
Capacitance - - - - -	3.7	4.6.4		
Dissipation factor - - - - -	3.8	4.6.5		

TABLE VIII-Group A inspection. - Continued

Examination or test	Requirement paragraph	Method paragraph	AQL (percent defective)	
			Major	Minor
<u>Subgroup 2</u>				
Visual and mechanical examination - - - - -	---	4.6.1	} 1	} 4
Physical dimensions - - - - -	3.3 to 3.4.4.1 incl			
Marking 1/- - - - -	3.21	4.6.1		
Workmanship - - - - -	3.22 to 3.22.2 incl	4.6.1		

1/ Marking defects are based on visual examination and will be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects.

4.5.1.1.2 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table IX, in the order shown, and shall be made on sample units which have been subjected to and have passed the group A inspection.

4.5.1.1.2.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105 for special inspection level S-4. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. The AQL shall be 4.0 percent defective.

4.5.1.1.2.2 Rejected lots. If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

TABLE IX. Group B inspection.

Examination or test	Requirement paragraph	Method paragraph
Insulation resistance (at high ambient) - - - - -	3.9	4.6.6
Barometric pressure (reduced) - - - - -	3.10	4.6.7
Life - - - - -	3.19	4.6.16.2

4.5.1.1.2.3 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on the contract or purchase order.

4.5.2 Qualification verification inspection. Qualification verification inspection shall consist of group C. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.2.1.3) delivery of products which have passed groups A and B shall not be delayed pending the results of these qualification verification inspections.

4.5.2.1 Group C inspection. Group C inspection shall consist of the examinations and tests specified in table X in the order shown.

4.5.2.1.1 Sampling plan. From each lot as specified in 4.5.1.1, the group C inspection shall be performed once each month. A sample, consisting of twelve specimens of voltage ratings representing a fair cross-section of the lot and of the highest watt-second rating in each voltage category, shall be selected for each of subgroups 1, 2, and 3 at random from each lot. Every 12 months, 12 sample capacitors which have completed the group B life test, shall be subjected to the extended life test of subgroup 4, in accordance with 4.6.16.3. Shipments of lots shall not be delayed pending results of the life test, except as specified in 4.5.2.1.3. Not more than one defective capacitor will be allowed for a single sample (12 specimens).

4.5.2.1.2 Disposition of sample units. Sample units which have been subjected to group C inspection shall not be delivered on the contract or purchase order.

TABLE X - Group C inspection.

Examination or test	Requirement paragraph	Method paragraph
<u>Subgroup 1</u>		
Vibration - - - - -	3.11	4.6.8
Salt spray (corrosion) - - - - -	3.12	4.6.9
Temperature cycling and immersion - - - - -	3.13	4.6.10
<u>Subgroup 2</u>		
Solderability (axial wire leads only)- - - - -	3.14	4.6.11
Shock, specified pulse - - - - -	3.15	4.6.12
Moisture resistance - - - - -	3.16	4.6.13
<u>Subgroup 3</u>		
Terminal strength - - - - -	3.17	4.6.14
Low temperature and capacitance change with temperature - - - - -	3.18	4.6.15
<u>Subgroup 4</u>		
Life (extended) - - - - -	3.19	4.6.16.3

4.5.2.1.3 Noncompliance. If a sample fails to pass group C inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, and so forth, and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections or the inspection which the original sample failed, at the option of the Government). Groups A and B inspections may be reinstituted; however, final acceptance shall be withheld until the group C reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.5.3 Inspection of preparation for delivery. Sample packages or packs and the inspection of the preservation and packaging, packing, and marking for shipment and storage shall be in accordance with the requirements of section 5 or the documents specified herein.

4.6 Methods of examination and test.

4.6.1 Examination. The sample capacitors shall be measured and visually examined to verify compliance with all of the requirements of this specification which do not involve tests (see 3.3 to 3.4.4.1 inclusive, 3.21, and 3.22).

4.6.2 Seal (see 3.5). Capacitors shall be tested in accordance with method 112 of MIL-STD-202, condition A. For liquid-filled capacitors, the following test may be substituted: Capacitors shall be placed with the terminals facing sideways (not upward) on a clean sheet of absorbent paper and exposed to a case temperature within $\pm 3^\circ$ of the applicable high test temperature (see 3.1) for a minimum of 1 hour. Capacitors shall then be visually examined for evidence of leakage of impregnant, filling compound, or bubbles from the seal.

4.6.3 Dielectric withstanding voltage (see 3.6). Capacitors shall be tested in accordance with method 301 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Magnitude of test voltage - As specified (see 3.1).
- (b) Nature of potential - DC.
- (c) Duration of application of test voltage - At least 98 percent of applied potential for 1 minute.
- (d) Points of application of test voltage - As specified (see 3.1).
- (e) Power supply voltage regulation - 2 percent or better.
- (f) Current resistance - Sufficient to limit charging current to 1.0 ampere maximum.

4.6.4 Capacitance (see 3.7). Capacitance shall be measured by method 305 of MIL-STD-202 with an accuracy within ± 2 percent, when referred to measurements made on a standard bridge at 60 or 1,000 Hz, as applicable, at a temperature of $25^{\circ}\text{C} \pm 3^{\circ}$ ($77^{\circ}\text{F} \pm 5^{\circ}$). Capacitors having a nominal capacitance greater than $1\ \mu\text{F}$ shall be measured at a frequency of $60 \pm 6\ \text{Hz}$. Capacitors having a nominal capacitance of $1\ \mu\text{F}$ or less shall be measured at a frequency of $1,000 \pm 100\ \text{Hz}$. The tolerance used for capacitance tests conducted at the contractor's plant shall be equal to the absolute tolerance, less the accuracy of the instrument used. The tolerance used for capacitance tests conducted at a Government laboratory shall be equal to the tolerance measured (absolute tolerance) plus the accuracy of the test equipment used.

4.6.5 Dissipation factor (see 3.8). The dissipation factor shall be measured at a temperature of $25^{\circ} \pm 3^{\circ}\text{C}$ at an ac voltage (rms) not greater than 20 percent of the rated dc voltage of the capacitor. Capacitors having a nominal capacitance of greater than $1\ \mu\text{F}$, shall be measured at a frequency of $60 \pm 5\ \text{Hz}$. Capacitors having a nominal capacitance of $1\ \mu\text{F}$ or less shall be measured at a frequency of $1,000 \pm 100\ \text{Hz}$.

4.6.6 Insulation resistance (see 3.9). Capacitors shall be tested in accordance with method 302 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Test potential - A potential equal to the rated dc voltage or 500 vdc, whichever is less.
- (b) Points of measurement -
 - (1) Terminal to terminal - Insulation resistance shall be measured between terminals at high ambient temperature, and at $25^{\circ} \pm 3^{\circ}\text{C}$ or corrected thereto (see 3.9.1). For quality conformance inspection, measurement at high ambient temperature is required only for those items to be subjected to life test.
 - (2) Terminal to case - When the case is not a terminal, the measurement shall be made between each terminal and the case at $25^{\circ} \pm 3^{\circ}\text{C}$ (see 3.9.2).
- (c) Electrification time - Not to exceed 2 minutes.

4.6.7 Barometric pressure (reduced) (see 3.10). Capacitors shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

- (a) Method of mounting - Not applicable.
- (b) Test condition letter - As specified (see 3.1).
- (c) Test during subjection to reduced pressure - A test potential equal to 125 percent of the DC rated voltage (see 3.1) shall be applied between each terminal and the case of the capacitor (except where a terminal and case are electrically identical) for at least 1 minute. However, for tubular styles the potential need not exceed the appropriate value as specified in figure 1.

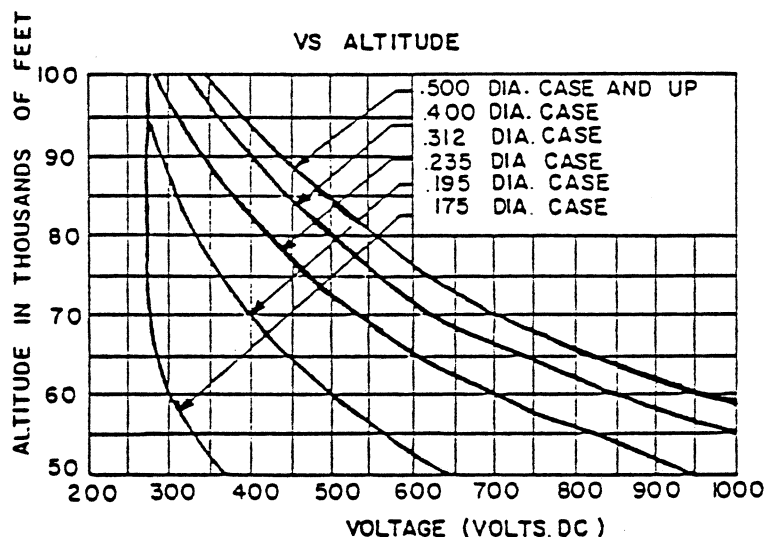


FIGURE 1. Breakdown voltage.

4.6.8 Vibration (see 3.11).

4.6.8.1 Low frequency. Capacitors shall be tested in accordance with method 201 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Tests and measurements prior to vibration - Not applicable.
- (b) Method of mounting - Securely fastened by normal mounting means.
Wire-lead capacitors shall be secured $1/2 \pm 1/8$ inch from the case.
- (c) Duration of vibration - 3 hours (60 minutes in each direction).
- (d) Tests and measurements during vibration - During the last 30 minutes of vibration in each direction, an electrical measurement shall be made to determine intermittent contacts or open- or short-circuiting.
- (e) Tests and measurements after vibration - Not applicable.

4.6.8.2 High frequency. Capacitors shall be tested in accordance with method 204 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Mounting of specimens - Capacitors shall be rigidly mounted by the body to a vibration-test apparatus. Wire-lead capacitors shall be secured $1/2 \pm 1/8$ inch from the case.
- (b) Test condition letter - B.
- (c) Duration and direction of motion - 4 hours in each of 3 mutually perpendicular directions (total of 12 hours), one parallel and the other perpendicular to the cylindrical axis.
- (d) Measurements during vibration - During the last cycle in each direction, an electrical measurement shall be made to determine intermittent contacts or open- or short-circuiting.
- (e) Measurements after vibration - Not applicable.

4.6.9 Salt spray (corrosion) (see 3.12). Capacitors shall be tested in accordance with method 101 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Applicable salt solution - The salt-solution concentration shall be 20 percent.
- (b) Test condition letter - B.
- (c) Measurements after exposure - Not applicable.

After the test, capacitors shall be visually examined for evidence of harmful corrosion, unwrapping of, or mechanical damage to insulating sleeves, and obliteration of marking.

4.6.10 Temperature cycling and immersion (see 3.13).

4.6.10.1 Temperature cycling. Capacitors shall be subjected to the temperature cycling test specified in method 102 of MIL-STD-202, with the following modifications:

- (a) Test condition D shall apply, except that step 3 shall be as specified (see 3.1).
- (b) No measurements shall be made before or after cycling.

4.6.10.2 Immersion. Following temperature cycling, capacitors shall be tested in accordance with method 104 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Test condition letter - C, except both hot and cold baths shall be a saturated solution of sodium chloride and water.
- (b) Measurements after final cycle - The capacitors shall be examined for evidence of extensive corrosion, obliteration of markings, and unwrapping or mechanical injury to insulating sleeves. Insulation resistance (see 4.6.6) and dielectric withstanding voltage (see 4.6.3) shall be measured between two wire windings 1/2 inch apart; each winding shall consist of three close turns of 0.040 inch (18 AWG) bare copper wire, placed around the sleeve of capacitors having insulating sleeves. In addition, all capacitors shall be subjected to the capacitance (see 4.6.4), dissipation factor (see 4.6.5), insulation resistance at $25^{\circ} \pm 3^{\circ} \text{C}$ (see 4.6.6), and dielectric withstanding voltage tests (see 4.6.3). The insulating sleeves of capacitors having insulating sleeves shall be removed for these tests.
- (c) For quality conformance inspection only, two immersion cycles and 30-minute exposures shall be required.

4.6.11 Solderability (axial wire leads only) (see 3.14). Capacitors shall be tested in accordance with method 208 of MIL-STD-202. The following details shall apply:

- (a) Number of terminations of each capacitor to be tested - 2.
- (b) Special preparation of the terminations - Prior to the application of the flux and solder dip, 50 percent of the capacitor leads shall be subjected to aging by immersion in a noncorrosive container of boiling, distilled water for a period of 1 hour. No aging shall be required for the remaining 50 percent of the capacitor leads.
- (c) Depth of immersion in flux and solder - Both leads shall be immersed to within 1/8 inch of the capacitor body.

4.6.12 Shock, specified pulse (see 3.15). Capacitors shall be tested in accordance with method 213 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Mounting - Rigidly mounted by the body.
- (b) Test condition letter - I.
- (c) Electrical loading during shock - During the test, a potential of 125 percent of rated dc voltage shall be applied between the terminals of the capacitor.
- (d) Measurements during and after shock - During the test, a cathode-ray oscilloscope or other comparable means shall be used as an indicating device in determining any electrical failures. After the test, capacitors shall be visually examined for evidence of breakdown, arcing, fractures, and other visible mechanical damage.

4.6.13 Moisture resistance (see 3.16). Capacitors shall be exposed to five cycles of the temperature cycle specified in 4.6.10 to condition the capacitors for the moisture resistance test. The moisture resistance test shall be performed in accordance with method 106 of MIL-STD-202 with the following details and exceptions:

- (a) Mounting - Capacitors shall be mounted by their normal mounting means. Capacitors which are normally supported by their wire leads (for example, CH09A1NE224K) shall be mounted to rigidly supported terminals so spaced that the length of each lead from the capacitor body shall be approximately 5/8 inch. Tubular capacitors of 0.670-inch nominal diameter and 1.250 inches in length, or greater, shall have a supplementary mounting means, and the leads shall be supported at the ends during vibration (see 6.4).
- (b) Subcycle - A total of five subcycles shall be performed. The vibration required in step 7 shall be in any direction.
- (c) Final measurements - After the final cycle, the capacitors shall be conditioned at $25^{\circ} \pm 10^{\circ} \text{C}$ ($77^{\circ} \pm 18^{\circ} \text{F}$) at a relative humidity of less than 80 percent and a barometric pressure between 28 and 32 inches of mercury. After a maximum of 24 hours, capacitors shall be examined for evidence of extensive corrosion, obliteration of marking, and unwrapping or mechanical injury to insulating sleeves. Insulation resistance (see 4.6.6), and dielectric withstanding voltage (see 4.6.3) shall be measured between two wire windings, 1/2-inch apart, each winding consisting of three close turns of 0.040 inch (18 AWG) bare copper wire, placed around the sleeve of capacitors having insulating sleeves. In addition, all capacitors shall be subjected to the capacitance, dissipation factor, insulation resistance of $25^{\circ} \pm 3^{\circ} \text{C}$, and the dielectric withstanding voltage tests. The insulating sleeves of capacitors having insulating sleeves shall be removed for these tests.
- (d) Loading (polarization) - During steps 1 to 6 inclusive, a dc potential of 100 volts or rated voltage, whichever is lower, shall be applied across the terminals of 50 percent of the capacitors. No potential shall be applied to the remaining 50 percent of the capacitors.

4.6.14 Terminal strength (see 3.17). Capacitors shall be tested in accordance with method 211 of MIL-STD-202. The following details and conditions shall apply:

- (a) Axial wire lead terminals - Test condition letters A and D (pull test and twist test, respectively).
 - (1) Applied force - Condition A, 4-1/2 pounds. Capacitor clamped by one lead and pull test load applied to the other lead. (One pull only.)
- (b) Terminals other than axial wire leads - Test condition letters A and E (pull test and torque test, respectively).
 - (1) Applied force - Condition A, as specified in table XI condition E, as specified in table XI

TABLE XI Terminal strength.

Terminal	Thread size		Pull Cond A Pounds	Torque Cond E Pound-inches
	Minimum	Maximum		
Solder lug - - - - -	---	---	2	2
Pillar insulator with threaded stud and nut - - - - -	10 to 32	12 to 24	10	15

4.6.15 Low temperature and capacitance change with temperature (see 3.18).

4.6.15.1 Low temperature. Capacitors shall be placed in a chamber maintained at $-55^{\circ} \pm 0^{\circ}_{-3} \text{C}$, and a potential equal to the dc voltage rating shall be applied at this condition for 48 ± 4 hours. The air within the conditioning chamber shall be circulated.

4.6.15.2 Capacitance change with temperature. At the conclusion of the test specified in 4.6.15.1, capacitance measurements shall be made as specified in 4.6.4, except that measurements shall be made at $-55^{\circ} \pm 0^{\circ}_{-3} \text{C}$, $25^{\circ} \pm 3^{\circ} \text{C}$, the high ambient test temperature, and $25^{\circ} \pm 3^{\circ} \text{C}$. The -55°C measurement shall be made before the capacitors are removed from the conditioning chamber. The measurement at each temperature shall be recorded when two successive readings taken at 5 minute intervals indicate no change in capacitance. Capacitors shall then be visually examined for evidence of breakdown, arcing, open- and short-circuiting, and other visible mechanical damage.

4.6.16 Life (see 3.19).

4.6.16.1 For qualification inspection. The capacitors shall be subjected for $1,000 \pm 8_0$ hours at the applicable high test temperature and the applicable specified dc voltage (see 3.1). During life testing, capacitors shall be separated by a distance of not less than 1 inch. Adequate circulation shall be provided to prevent the temperature within 6 inches of a capacitor from departing more than $\pm 3^{\circ} \text{C}$ from the nominal ambient temperature of the chamber. Radiation shall not be used as a means of heating the chamber. The voltage shall be applied to each capacitor through its individual current-limiting resistor as determined from the formula:

$$R = 0.025/C$$

Where:

C is the nominal capacitance in farads.

R is resistance in ohms and is to be within ± 10 percent of calculated value; however, R need not exceed 2 megohms.

NOTE: The actual current-limiting resistor employed shall have a resistance value within ± 10 percent of the calculated value (R); however, R need not exceed 2 megohms.

The dissipation factor of each sample shall be measured as specified in 4.6.5 at the high test temperature after 24 hours, but not more than 48 hours from the start of the life test, and also at any time during the last 48 hours of the life test. During these measurements, the dc voltage shall be removed from the capacitor terminals. After the conditioning, capacitors shall be returned to standard test conditions, and capacitance, dissipation factor, and insulation resistance shall be measured as specified in 4.6.4, 4.6.5, and 4.6.6, respectively.

4.6.16.2 For group B quality conformance inspection. Capacitors shall be tested under the same conditions as specified in 4.6.16.1 except that test duration shall be 250 hours.

4.6.16.3 For group C extended life. Every 2 months, capacitors that have completed the group B test shall be extended for an additional 750 hours under the same conditions.

4.6.17 Flashpoint of impregnant (see 3.21). The flashpoint of impregnant shall be measured as specified in ASTM Publication D56-64, except that fire point and precision do not apply. The word "impregnant" shall be substituted for the word "oil" throughout the test method.

5. PREPARATION FOR DELIVERY

5.1 Capacitors shall be prepared for delivery in accordance with MIL-C-39028.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Title, number, and date of the applicable specification sheet, and the complete type designation (see 3.1).
- (c) Selection of applicable level of preservation, packaging, and packing (see 5.1).
- (d) Whether removable mounting brackets are to be supplied with the capacitors.

6.2 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-18312, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement; and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the qualified products list is the Naval Electronic Systems Command, ELEX 0517, Department of the Navy, Washington, D.C. 20360. Information pertaining to qualification of products may be obtained from either the NAVAL ELECTRONIC SYSTEMS COMMAND or the Defense Electronics Supply Center (DESC), Dayton, Ohio 45401, agent for administration of the Qualified Products List. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.2.1).

6.2.1 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.3 Prevention of corona. All metal parts, fittings, conductors, and attachments which operate at higher potential than other adjacent parts of the housing, should be carefully finished in order to insure that all sharp corners and edges are removed to minimize the possibility of corona discharge under the service conditions specified herein. Parts, such as conductors, from which the removal of sharp corners and edges would be impractical, should be spaced in such a manner as to prevent harmful corona discharges under the service conditions specified herein.

6.4 Mounting. Tubular style capacitors with dimension L or D of 1.250 or 0.670 inches, respectively, and greater, should not be supported by their leads. These capacitors should be provided with a supplementary means for mounting, such as a tangential bracket for uninsulated cases and a wrap-around band for insulated cases.

6.5 Definitions.

6.5.1 Liquid-filled capacitors (see 3.3.3). A liquid-filled capacitor is a capacitor in which a liquid impregnant occupies substantially all of the case volume not required by the capacitor element and its connections. Space may be allowed for expansion of the liquid under temperature variation.

6.5.2 Momentary breakdown (see 3.6). Momentary breakdown is defined as a single or a series of rapidly succeeding capacitor discharges evidenced by abrupt decreases in insulation resistance of values below the limit specified in 3.9 and followed by restoration of the resistance to a value above this limit.

6.5.3 Flashpoint of impregnant (see 3.20). Flashpoint of a material (liquid or solid) which emits combustible vapor may be defined as the temperature to which the material must be heated in order to emit sufficient vapor to form a flammable mixture with air.

6.6 Standard capacitor types. Equipment designers should refer to MIL-STD-198, "Capacitors, Selection and Use of" for standard capacitor types and selected values. MIL-STD-198 provides a selection of standard capacitors for new equipment design.

6.7 Supersession data. One style formerly covered by this specification has been cancelled. Recommended substitute items are as follows:

<u>Deleted</u> <u>specification sheet</u>	<u>Recommended</u> <u>substitute style</u>
MIL-C-18312/1	CH09

6.8 Recommended voltage derating. The recommended maximum dc working voltage permitted in the applicable temperature range shall be no greater than the value specified in table IV, less the peak value of the ac voltage. The peak ac component of voltage should not exceed 20 percent of the dc voltage rating shown in table IV, or the value calculated from the following formula, whichever is smaller:

$$V_p \cdot AC. = \sqrt{\frac{(T_{dc} - T) A e}{\pi f C D}}$$

- Where: $V_p \cdot AC.$ = peak value of ac component.
 f = frequency in cycles per second of ac component.
 D = maximum dissipation factor shown in 3.8, at the applicable high test temperature (see 3.1).
 C = nominal capacitance in farads.
 A = exposed capacitor case surface area in square centimeter (cm^2); exclusive of portions occupied by terminal mountings.
 T_{dc} = high ambient test temperature in degrees centigrade (see 3.1).
 T = maximum ambient operating temperature expected within equipment containing capacitor.
 e = convection coefficient in watts per cm^2 per $^{\circ}C$. The value of "e" is approximately equal to 0.0006.

Notwithstanding this requirement for operation in the interval of 84° to $85^{\circ}C$ for characteristic R units and 124° to $125^{\circ}C$ for characteristic N units the value of $84^{\circ}C$ and $124^{\circ}C$, respectively, should be applied for "T" in the formula with the value of ac component not to exceed 1 percent of the rated dc voltage.

Custodians:
 Army - EL
 Navy - EC
 Air Force - 11

Preparing activity:
 Navy - EC
 (Project 5910-0968)

Review activities:
 Army - EL, MU
 Navy - EC
 Air Force - 11, 17, 85
 DSA - ES

User activities:
 Army - None
 Navy - MC, AS, OS, CG
 Air Force - 19

APPENDIX

PROCEDURE FOR QUALIFICATION INSPECTION

10. SCOPE

10.1 This appendix details the procedure for submission of samples, with related data, for qualification inspection of capacitors covered by this specification. The procedure for extending qualification of the required sample to other capacitors covered by this specification is also outlined herein.

20. SUBMITTAL PLANS ^{1/}

20.1 Single type. The following details shall apply:

- (a) Sample size - As specified in table VI.
- (b) Sampling criteria - Sample units of the same style, rated voltage, capacitance tolerance, operating temperature range, insulating sleeve material (when applicable), terminal, case material and finish shall be submitted.
- (c) Limits of coverage - Qualification coverage shall be extended to all lesser capacitance values and broader capacitance tolerances in the same rated voltage. Circuit diagram 1 will qualify circuit diagram 3.

20.2 Combined type. The following details shall apply:

- (a) Sample size - As specified in table XII.
- (b) Sampling criteria - Sample units of the same operating temperature range, capacitance tolerance, insulating sleeve material (when applicable), case material, and finish may be submitted.
- (c) Limits of coverage - Qualification will be extended to all broader capacitance tolerances, all capacitance values and rated voltages between the values and ratings submitted in the same temperature range. Circuit diagram 1 will qualify circuit diagram 3.

20.3 Impregnant. Two hundred cubic centimeters of each impregnant used in the specimens for which approval is sought shall be submitted. On subsequent submissions, an impregnant which has successfully withstood the flashpoint of impregnant test (see 4.6.17) need not be submitted.

^{1/} The manufacturer shall confer with the Defense Electronics Supply Center (DESC-E), 1507 Wilmington Pike, Dayton, Ohio 45401, prior to submission of qualification approval samples, in order to plan the smallest and most effective submission.

TABLE XII Specimens for complete qualification submission.

Qualification group	Style	Parts to be submitted	Quantity for complete qualification groups
A (operating temperature range -55 to +85°C)	CH09	CH09A1RA183K	25
		CH09A1RA126K	25
B (operating temperature range -55 to +125°C)	CH09	CH09A1NC104K	25
	CH12	CH12A1NF225K	25
C	CH53	CH53B1NF475K	25
	CH54	CH54B1NV475K	25

20.4 Test data. When specifically requested, each submission shall be accompanied by test data covering the nondestructive tests listed in table XII which have been performed on the specimens. The performance of the destructive tests by the manufacturer on a duplicate set of specimens is encouraged, although not required. All test data shall be submitted in duplicate.

20.5 Description of items. The manufacturer shall submit a detailed statement of the materials and constructional features of the capacitors being submitted for test, including information on whether they are liquid filled or liquid impregnated; the type and quantity of the impregnant; the type, thickness, and number of layers of the capacitor tissue and foil; material, thickness, and applied finish of the case and details of the terminal assemblies.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

☐ YES ☐ NO (If "Yes", in what way?)

4. REMARKS

SUBMITTED BY (Printed or typed name and address - Optional)

TELEPHONE NO.

DATE

DD FORM 1426
1 JAN 72

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802